Preliminary Report
National Remote Sensing Centre (ISRO), Hyderabad
Disaster Support Centre, Disaster Management Support Programme

Satellite Remote Sensing Based Forest Fire Monitoring of Telangana Forest Fires, 2024

Fire Event

The present activity is taken up to monitor forest fires that have occurred during 21st March 2024-27th March 2023.

Background

As part of the near real time monitoring of forest fires, fire alerts are generated within 30 minutes of the satellite pass (day & night from MODIS (onboard TERRA & AQUA) & VIIRS data (onboard S-NPP and NOAA20)) collected over India and sent to the primary user FSI, Dehradun. These forest fire alerts are also disseminated using ISRO geo-visualization portal –Bhuvan (https://bhuvan-app1.nrsc.gov.in/disaster/disaster.php?id=fire) and through National Database for Emergency Management (NDEM) portal (https://ndem.nrsc.gov.in/forestfire_activefire.php).

Long duration fire events

The term LDFE or long duration fire event to designate areas where fire activity has been persistent. This information should be useful to fire managers and decision makers and LDFE locations could be prioritized for fire control and management operations. A long duration fire event (LDFE) is defined as any fire detection burning for over 48 hours. A procedure to identify the spatial and temporal continuity of fire activity using the NRT AFL product is developed. The output products are LDFE centroids and the list of AFLS that belong to the LDFE. Each LDFE has a unique cluster id. Updates are produced pass wise. An LDFE cluster is deemed closed if the stopping criterion, no active fires in the 4 consecutive passes following the cluster initiation is met.

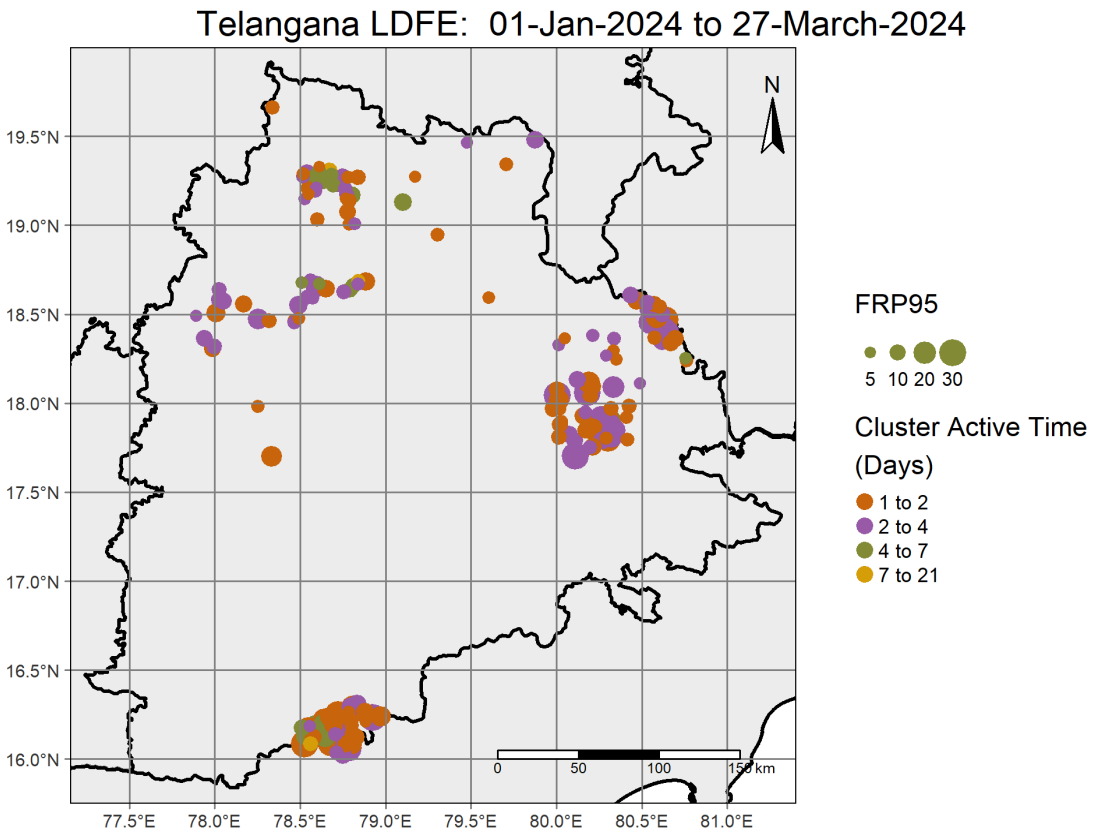
Telangana state LDFE

LDFE Algorithm was used to identify persistent fire activity in Telangana based on AFL from 2 sensors and four satellites (MODIS TERRA,MODIS AQUA, S-NPP-VIIRS 375m, JPSS1-VIIRS 375m)

obtained through National Database for Emergency Management (NDEM) portal (https://ndem.nrsc.gov.in/forestfire_activefire.php) form 1st January 2024 to present (27th March 2024).

Class	Closed Events	Active Events
1 - 2 days	88	25
2 - 4 days	65	22
4 - 7 days	20	1
>7 days	3	NA

Telangana State LDFE Summary



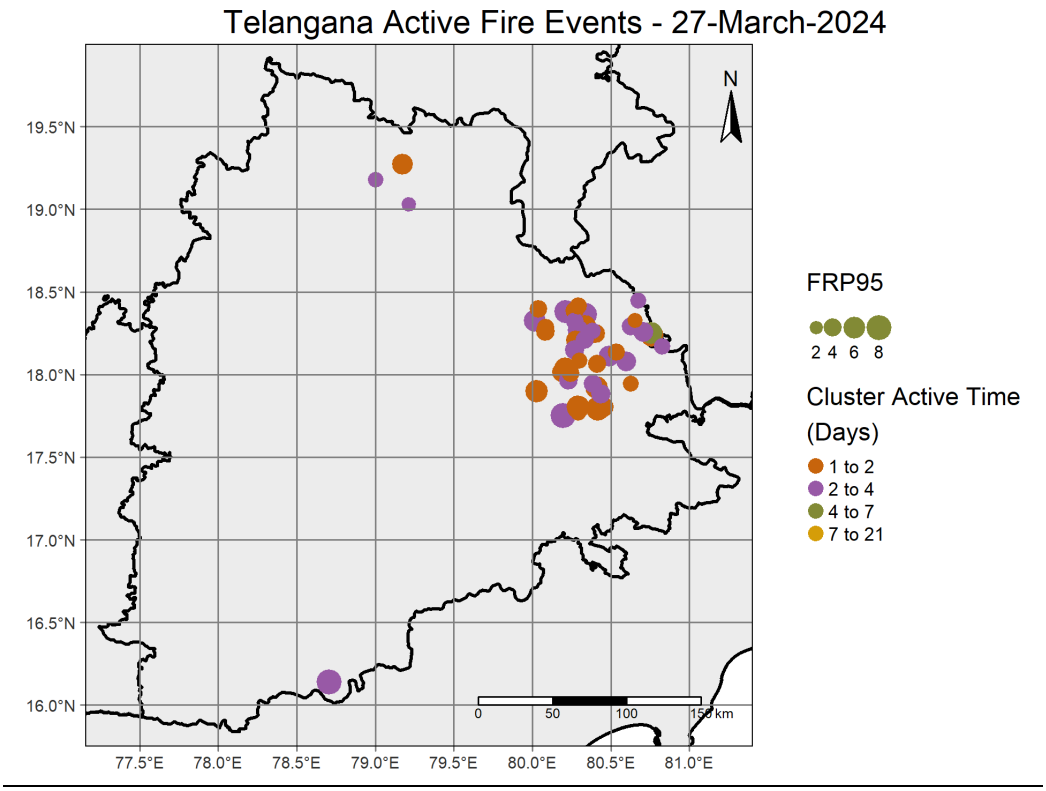
All fire clusters having duration > 1 day in Telangana state from 1st January 2024 to present

(Forest Mask applied)

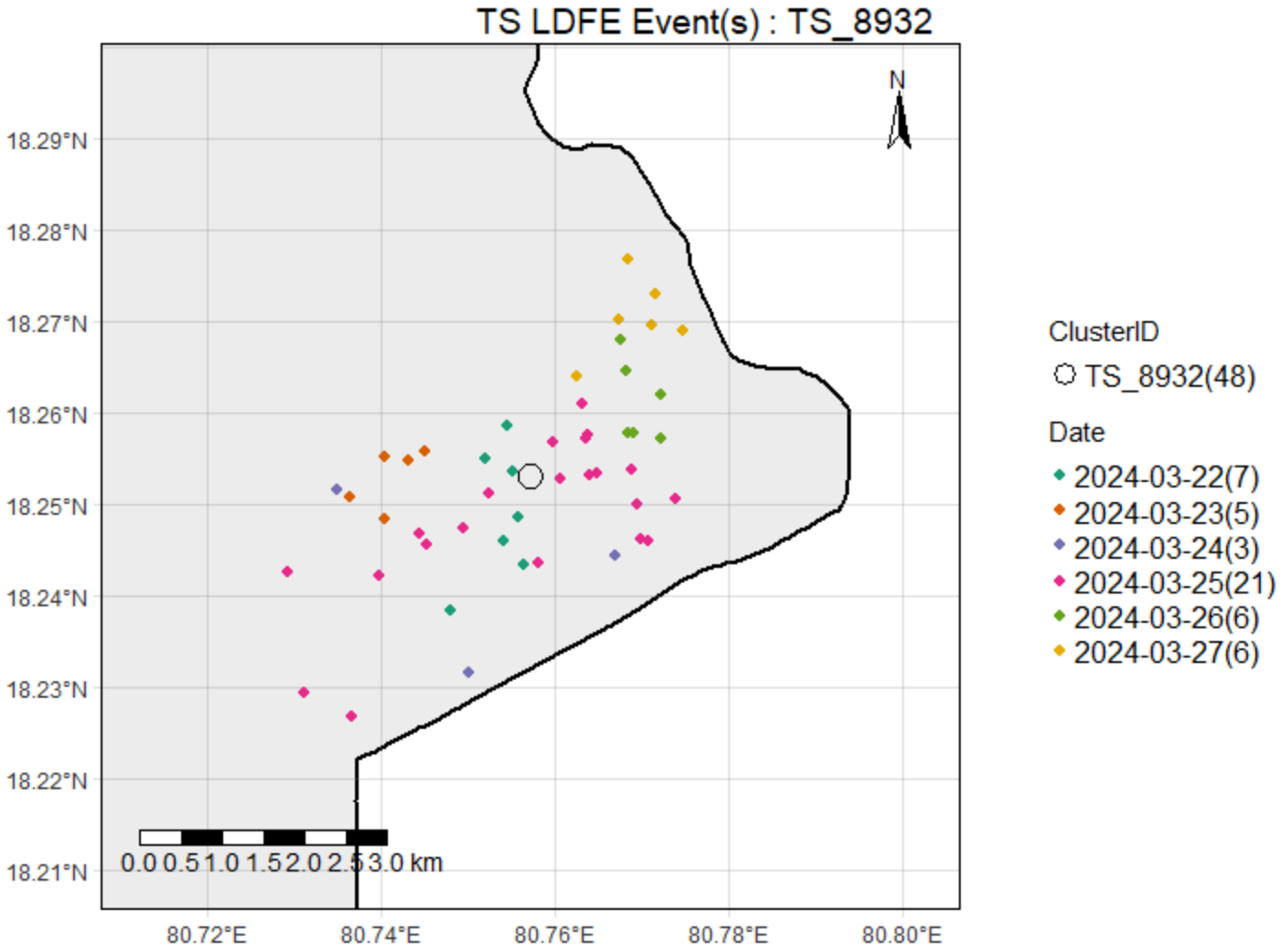
LDFE from 22-03-2024

Number of newly detected clusters (Active time > 24 h) on 2024-03-27 10:30:00 : 25

Number of clusters closed on 2024-03-26: 0



Fire Clusters active as of 27-03-2024 (10:30 AM)

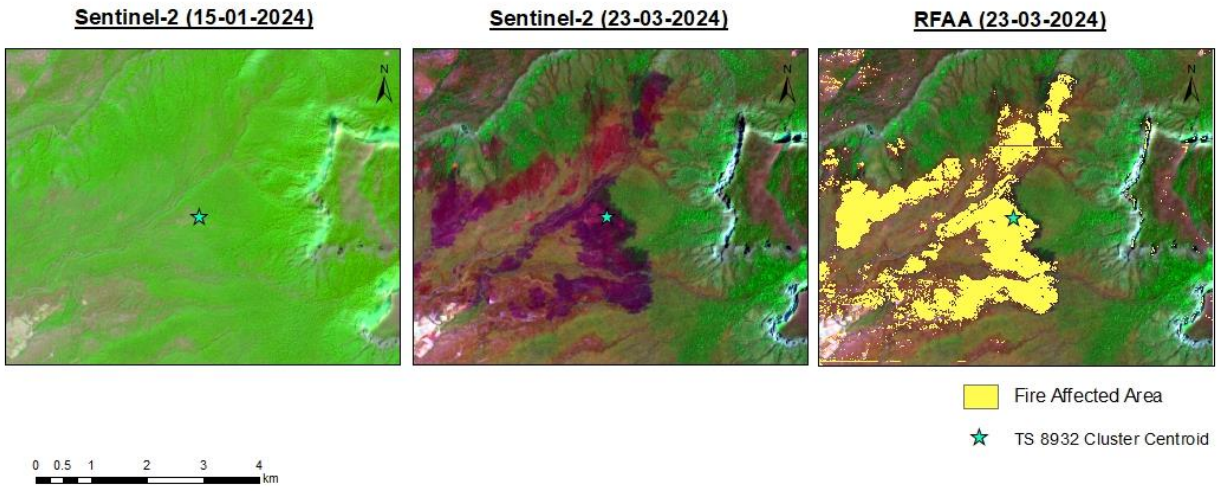


AFL around a currently active cluster TS_8932 (Active time ~ 4.5 days)

Rapid Fire Affected Area Assessment

The area of a fire event cannot be inferred from the LDFE as AFLs can be as small as 0.014% of the pixel and show high variability, and additionally could include several fire fronts. We have developed automated non-interactive, machine language based procedures to delineate the fire affected area (Rapid fire affected area assessment or RFAA) using multi spectral satellite imagery drawn from the ISRO EO data hub, Bhoonidhi(https://bhoonidhi.nrsc.gov.in/bhoonidhi/home.html).

Methods for automated extraction of burned area was developed using random forest - decision tree based algorithm which is an ensemble of several burn indices. The approach is region-specific and the model is currently calibrated for Telangana and Odisha forests. The following figure shows rapid fire affected area extraction done using the prototype model. It may be noted that since the model is designed to be region-specific, more training of the model for all representative forest types in India is required.



Rapid Fire Affected Area Assessment